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Education and Academic Career:

2006 Professor, School of Pharmaceutical Sciences, University of Shizuoka

1998-1999 Visiting Scientist (St. Jude Children's Research Hospital, U.S.A.)

1996 Associate Professor, School of Pharmaceutical Sciences, University of Shizuoka

1994 Assistant Professor, School of Pharmaceutical Sciences, University of Shizuoka

1991 Research Associate, School of Pharmaceutical Sciences, University of Shizuoka

1984 Ph.D., Graduate School of Pharmaceutical Sciences, Shizuoka College of Pharmacy

1979 Graduate from Shizuoka College of Pharmacy

List of Publications (2002~2016):

- 1) Akira Minami, Masakazu Saito, Shou Mamada, Daisuke Ieno, Tomoya Hikita, Tadanobu Takahashi, Tadamune Otsubo, Kiyoshi Ikeda and Takashi Suzuki: Role of sialidase in long-term potentiation at mossy fiber-CA3 synapses and hippocampus-dependent spatial memory. PLoS One, 11(10), e0165257 (2016)
- 2) Akira Minami, Hiroshi Matsushita, Daisuke Ieno, Yukino Matsuda, Yuuki Horii, Ami Ishii, Tadanobu Takahashi, Hiroaki Kanazawa, Akihiko Wakatsuki, Takashi Suzuki: Improvement of neurological disorders in postmenopausal model rats by administration of royal jelly. Climacteric, 19(6), 568-573 (2016)
- 3) Tadanobu Takahashi, Saori Unuma, Sawako Kawagishi, Yuuki Kurebayashi, Maiko Takano, Hiroki Yoshino, Akira Minami, Takashi Yamanaka, Tadamune Otsubo, Kiyoshi Ikeda, Takashi Suzuki: Substrate specificity of equine and human influenza A virus sialidase to molecular species of sialic acid. Biol. Pharm. Bull., 39, 1728-1733 (2016)
- 4) Masanori Nagao, Yuuki Kurebayashi, Hirokazu Seto, Tadanobu Takahashi, Takashi

- Suzuki, Yu Hoshino, Yoshiko Miura: Polyacrylamide backbones for polyvalent bioconjugates using “post-click” chemistry. *Polym. Chem.*, 7, 5920-5924 (2016)
- 5) Yuuki Kurebayashi, Tadanobu Takahashi, Chihiro Tamoto, Keiji Sahara, Tadamune Otsubo, Tatsuya Yokozawa, Nona Shibahara, Hirohisa Wada, Akira Minami, Kiyoshi Ikeda, Takashi Suzuki: High efficiency capture of drug resistant influenza virus by sialidase activity. *PLoS One*, 11(5), e0156400 (2016)
 - 6) Masanori Nagano, Yuuki Kurebayashi, Hirokazu Seto, Tomonari Tanaka, Tadanobu Takahashi, Takashi Suzuki, Yu Hoshino, Yoshiko Miura: Synthesis of well-controlled glycopolymers bearing oligosaccharides and their interactions with influenza viruses. *Polym. J.*, 48, 745-749 (2016)
 - 7) Tadanobu Takahashi, Takashi Agarikuchi, Yuuki Kurebayashi, Nona Shibahara, Chihiro Suzuki, Akiko Kishikawa, Keijo Fukushima, Maiko Takano, Fumie Suzuki, Hirohisa Wada, Tadamune Otsubo, Kiyoshi Ikeda, Akira Minami, Takashi Suzuki: Easy and Rapid Detection of Mumps Virus by Live Fluorescent Visualization of Virus-Infected Cells. *PLoS One* 10, e0144038 (2015)
 - 8) Yuko Morii, Hiroshi Matsushita, Akira Minami, Hiroaki Kanazawa, Takashi Suzuki, Sanan Subhadhirasakul, Kazushi Watanabe, Akihiko Wakatsuki: Young Coconut Juice Supplementation Results in Greater Bone Mass and Bone Formation Indices in Ovariectomized Rats: A Preliminary Study. *Phytother. Res.* (2015) doi: 10.1002/ptr.5489
 - 9) Risa Taguchi*, Akira Minami* (*they contributed equally as first authors), Yukino Matsuda, Tadanobu Takahashi, Tadamune Otsubo, Kiyoshi Ikeda, Takashi Suzuki: Preferential accumulation of ¹⁴C-N-glycolylneuraminic acid over ¹⁴C-N-acetylneuraminic acid in the rat brain after tail vein injection. *PLoS One* 10, e0131061 (2015)
 - 10) Ippei Watanabe, Tomoya Hikita, Haruka Mizuno, Risa Sekita, Akira Minami, Ami, Ishii, Yuka Minamisawa, Kiyoshi Suzuki, Hiroshi Maeda, Kazuya I P J Hidari, Takashi Suzuki: Isolation and characterization of monoclonal antibodies specific for chondroitin sulfate E. *Glycobiology* 25, 953-962 (2015)
 - 11) Tadanobu Takahashi, Sawako Kawagishi, Hiroki Funahashi, Nonoka Hayashi, Takashi Suzuki: Production and purification of secretory simian cytidine monophosphate-N-acetyl neuraminic acid hydroxylase by using baculovirus-protein expression system. *Biol. Pharm. Bull.* 38, 1220-1226 (2015)
 - 12) Tadanobu Takahashi, Maiko Takano, Yuuki Kurebayashi, Takashi Agarikuchi, Chihiro Suzuki, Keijo Fukushima, Shunsaku Takahashi, Tadamune Otsubo, Kiyoshi Ikeda, Akira Minami, Takashi Suzuki: Rapid fluorescent detection assay for

- human parainfluenza viruses. *Biol. Pharm. Bull.* 38, 1214-1219 (2015)
- 13) Keijo Fukushima, Tadanobu Takahashi, Hiroo Ueyama, Masahiro Takaguchi, Seigo Ito, Kenta Oishi, Akira Minami, Erika Ishitsubo, Hiroaki Tokiwa, Toru Takimoto, Takashi Suzuki: Amino acid substitutions contributing to α 2,6-sialic acid linkage binding specificity of human parainfluenza virus type 3 hemagglutinin-neuraminidase. *FEBS Lett.* 589, 1278-1282 (2015)
 - 14) Kentaro Shoji, Tadanobu Takahashi, Kohta Kurohane, Koki Iwata, Takeshi Matsuoka, Shogo Tsuruta, Takatomo Sugino, Masaki Miyake, Takashi Suzuki, Yasuyuki Imai: Recombinant IgA specific for influenza A virus hemagglutinin: production, functional analysis and formation of secretory IgA. *Viral Immunol.* 28, 170-178 (2015)
 - 15) Tomohiro Kawahara, Tadanobu Takahashi, Kenta Oishi, Hiromu Tanaka, Midori Masuda, Shunsaku Takahashi, Maiko Takano, Tatsuya Kawakami, Keijo Fukushima, Hiroaki Kanazawa, Takashi Suzuki: Consecutive oral administration of *Bifidobacterium longum* MM-2 improves the defense system against influenza virus infection by enhancing natural killer cell activity in a murine model. *Microbiol. Immunol.* 59, 1-12 (2015)
 - 16) Mikiko Tsukimoto, Rikiya Ohashi, Nao Torimoto, Yoko Togo, Takashi Suzuki, Toshio Maeda, Yoshiyuki Kagawa: Effects of the inhibition of intestinal P-glycoprotein on aliskiren pharmacokinetics in cynomolgus monkeys. *Biopharm. Drug Dispos.* 36, 15-33 (2015)
 - 17) Yohei Watanabea, Tetsuo Ito, Madiha S. Ibrahim, Yasuha Arai, Kozue Hotta, Hoang Vu Mai Phuong, Nguyen Le Khanh Hang, Le Quynh Mai, Kosuke Soda, Masaoki Yamaoka, Emmanuel Djoko Poetranto, Laksmi Wulandari, Hiroaki Hiramatsu, Tomo Daidoji, Ritsuko Kubota-Koketsu, Nongluk Sriwilajaroen, Takaaki Nakaya, Yoshinobu Okuno, Tadanobu Takahashi, Takashi Suzuki, Toshihiro Ito, Hak Hotta, Tetsu Yamashiro, Tsukasa Hayashi, Kouichi Morita, Kazuyoshi Ikuta, Yasuo Suzuki: A novel immunochromatographic system for easy-to-use detection of group 1 avian influenza viruses with acquired human-type receptor binding specificity. *Biosens. Bioelectron.* 65, 211-219 (2014)
 - 18) Tadanobu Takahashi, Maiko Takano, Takashi Agarikuchi, Yuuki Kurebayashi, Akira Minami, Tadamune Otsubo, Kiyoshi Ikeda, Takashi Suzuki: A novel method for detection of Newcastle disease virus with a fluorescent sialidase substrate. *J. Virol. Methods* 209, 136-142 (2014)
 - 19) Tadanobu Takahashi, Tadamune Otsubo, Kiyoshi Ikeda, Akira Minami, Takashi Suzuki: Histochemical imaging of alkaline phosphatase using a novel fluorescent

- substrate. *Biol. Pharm. Bull.* 37, 1668-1673 (2014)
- 20) Keijo Fukushima 1, Tadanobu Takahashi 1 (1, they contributed equally as first authors), Seigo Ito, Masahiro Takaguchi, Maiko Takano, Yuuki Kurebayashi, Kenta Oishi, Akira Minami, Tatsuya Kato, Enoch Y Park, Hidekazu Nishimura, Toru Takimoto, Takashi Suzuki: Terminal Sialic Acid Linkages Determine Different Cell Infectivities of Human Parainfluenza Virus Type 1 and Type 3. *Virology* 464-465, 424-431 (2014)
 - 21) Tomoko Abe, Ayumi Sando, Fumiteru Teraoka, Tadamune Otsubo, Kouichi Morita, Hiroaki Tokiwa, Kiyoshi Ikeda, Takashi Suzuki, Kazuya I.P.J. Hidari: Computational design of a sulfoglucuronide derivative fitting into a hydrophobic pocket of dengue virus E protein. *Biochem. Biophys. Res. Commun.* 449, 32-37 (2014)
 - 22) Tadanobu Takahashi, Maiko Takano, Yuuki Kurebayashi, Midori Masuda, Sawako Kawagishi, Masahiro Takaguchi, Takashi Yamanaka, Akira Minami, Tadamune Otsubo, Kiyoshi Ikeda, Takashi Suzuki: *N*-glycolylneuraminic Acid on Human Epithelial Cells Prevents Entry of Influenza A Virus with *N*-glycolylneuraminic Acid Binding Ability. *J. Virol.* 88, 8445-8456 (2014)
 - 23) Tohru Yoneyama, Chikara Ohya, Shingo Hatakeyama, Shintaro Narita, Tomonori Habuchi, Takuya Koie, Kazuyuki Mori, Kazuya I Hidari, Maho Yamaguchi, Takashi Suzuki, Yuki Tobisawa: Measurement of aberrant glycosylation of prostate specific antigen can improve specificity in early detection of prostate cancer. *Biochem. Biophys. Res. Commun.* 448, 390-396 (2014)
 - 24) Yuuki Kurebayashi, Tadanobu Takahashi, Tadamune Otsubo, Kiyoshi Ikeda, Shunsaku Takahashi, Maiko Takano, Takashi Agarikuchi, Tsubasa Sato, Yukino Matsuda, Akira Minami, Hiroaki Kanazawa, Yuko Uchida, Takehiko Saito, Yoshihiro Kawaoka, Toshihiro Yamada, Fumihiko Kawamori, Robin Thomson, Mark von Itzstein, Takashi Suzuki: Imaging of influenza virus sialidase activity in living cells. *Sci. Rep.*, 4, 4877 (2014)
 - 25) Maiko Takano, Tadanobu Takahashi, Takashi Agarikuchi, Yuuki Kurebayashi, Akira Minami, Tadamune Otsubo, Kiyoshi Ikeda, Hiroaki Kanazawa, Takashi Suzuki: Histochemical fluorescent staining of Sendai virus-infected cells with a novel sialidase substrate. *Virology* 464-465, 206-212 (2014)
 - 26) Akira Minami, Tadamune Otsubo, Daisuke Ieno, Kiyoshi Ikeda, Hiroaki Kanazawa, Kosuke Shimizu, Ko Ohata, Tsunehiro Yokochi, Yuuki Horii, Hokuto Fukumoto, Risa Taguchi, Tadanobu Takahashi, Naoto Oku and Takashi Suzuki: Visualization of sialidase activity in mammalian tissues and cancer detection with a novel

- fluorescent sialidase substrate. *PLoS ONE* 9, e81941 (2014)
- 27) Yuriko Ohyama, Hiroshi Matsushita, Akira Minami, Hiroaki Kanazawa, Takashi Suzuki, Kazushi Watanabe, Akihiko Wakatsuki: Lack of effect of the ethanol extract of *Pleurotus eryngii* on bone metabolism in ovariectomized rats. *Climacteric* 17, 492-499 (2014)
 - 28) Makoto Ogata, Hirotaka Uzawa, Kazuya I. P. J. Hidari, Takashi Suzuki, Enoch Y. Park, and Taichi Usui: Facile Synthesis of Sulfated Sialoglycopolypeptides with a γ -Polyglutamic Acid Backbone as Hemagglutinin Inhibitors against Influenza Virus. *J. Appl. Glycosci.* 61, 1-7 (2014)
 - 29) Mai Oba, Yayoi Ueno, Satoru Kitani, Takuya Hayakawa, Tadanobu Takahashi, Takashi Suzuki, Masayuki Sato, Kiyoshi Ikeda: Ferrier glycosylation reaction catalyzed by Bi(OTf)₃-montmorillonite K-10: efficient synthesis of 3,4-unsaturated sialic acid derivatives: synthesis and biological evaluation as inhibitors of human parainfluenza virus type 1. *Heterocycles* 89, 69-81 (2014)
 - 30) Minami A, Matsushita H, Horii Y, Ieno D, Matsuda Y, Saito M, Kanazawa H, Ohyama Y, Wakatsuki A, Takeda A, Hidari KI, Sabaratnam V, Suzuki T: Improvement of depression-like behavior and memory impairment with the ethanol extract of *Pleurotus eryngii* in ovariectomized rats. *Biol. Pharm. Bull.* 36, 1990-1995 (2013)
 - 31) Takahashi T, Kawakami T, Mizuno T, Minami A, Uchida Y, Saito T, Matsui S, Ogata M, Usui T, Sriwilaijaroen N, Hiramatsu H, Suzuki Y, Suzuki T: Sensitive and direct detection of receptor binding specificity of highly pathogenic avian influenza A virus in clinical samples. *PLoS ONE* 8, e78125 (2013)
 - 32) Hidari KI, Yamaguchi M, Ueno F, Abe T, Yoshida K, Suzuki T: Influenza virus utilizes N-linked sialoglycans as receptors in A549 cells. *Biochem. Biophys. Res. Commun.* 436, 394-399 (2013)
 - 33) Minami A, Ishibashi S, Ikeda K, Ishitsubo E, Hori T, Tokiwa H, Taguchi R, Ieno D, Otsubo T, Matsuda Y, Sai S, Inada M, Suzuki T: Catalytic preference of *Salmonella typhimurium* LT2 sialidase for N-acetylneuraminic acid residue over N-glycolylneuraminic acid residue. *FEBS Open Bio* 3, 231-236 (2013)
 - 34) Takahashi T, Song J, Suzuki T, Kawaoka Y: Mutations in NA that induced low pH-stability and enhanced the replication of pandemic (H1N1) 2009 influenza A virus at an early stage of the pandemic. *PLoS ONE* 8, e64439 (2013)
 - 35) Takahashi T, Kawagishi S, Masuda M, Suzuki T: Binding kinetics of sulfatide with influenza A virus hemagglutinin. *Glycoconj. J.* 30, 709-716 (2013)
 - 36) Takahashi T, Takaguchi M, Kawakami T, Suzuki T: Sulfatide regulates

- caspase-3-independent apoptosis of influenza A virus through viral PB1-F2 protein. *PLoS ONE* 8, e61092 (2013)
- 37) Hidari KI, Abe T, Suzuki T: Carbohydrate-related inhibitors of dengue virus entry. *Viruses* 5, 605-618 (2013)
- 38) Otsubo T, Minami A, Fujii H, Taguchi R, Takahashi T, Suzuki T, Teraoka F, Ikeda K: 2-(Benzothiazol-2-yl)-phenyl- β -D-galactopyranoside derivatives as fluorescent pigment dyeing substrates and their application for the assay of β -D-galactosidase activities. *Bioorg. Med. Chem. Lett.* 23, 2245-2249 (2013)
- 39) Nishino R, Hayakawa T, Takahashi T, Suzuki T, Sato M, Ikeda K: Syntheses of 2-Deoxy-2,3-didehydro-N-acetylneuraminic Acid Analogues Modified by α -Acylaminoamido Groups at the C-4 Position Using Isocyanide-Based Four-Component Coupling and Biological Evaluation as Inhibitors of Human Parainfluenza Virus Type 1. *Chem. Pharm. Bull.* 61(1), 69-74 (2013)
- 40) Takahashi T, Nidom AC, QuynhLe IM, Suzuki T, Kawaoka Y: Amino acid determinants conferring stable sialidase activity at low pH for H5N1 influenza A virus neuraminidase. *FEBS Open Bio* 2, 261-266 (2012)
- 41) Hidari KI, Ikeda K, Watanabe I, Abe T, Sando A, Itoh Y, Tokiwa H, Morita K, Suzuki T: 3-O-sulfated glucuronide derivative as a potential anti-dengue virus agent. *Biochem Biophys Res Commun.* 424(3), 573-578 (2012)
- 42) Nohara T, Imamura A, Yamaguchi M, Hidari KI, Suzuki T, Komori T, Ando H, Ishida H, Kiso M: Design and Synthesis of a Novel Ganglioside Ligand for Influenza A Viruses. *Molecules.* 17(8), 9590-9620 (2012)
- 43) Itoh Y, Sando A, Ikeda K, Suzuki T, Tokiwa H: Origins of the inhibitory activity of 4-O-substituted sialic derivatives of human parainfluenza virus. *Glycoconj. J.* 29, 231-237 (2012)
- 44) Takahashi T, Ito K, Fukushima K, Takaguchi M, Hayakawa T, Suzuki Y, Suzuki T: Sulfatide Negatively Regulates the Fusion Process of Human Parainfluenza Virus Type 3. *J. Biochem.* 152, 373-380 (2012)
- 45) Yamanaka T, Nemoto M, Bannai H, Tsujimura K, Kondo T, Matsumura T, Muranaka M, Ueno T, Kinoshita Y, Niwa H, Hidari KI, Suzuki T: No evidence of horizontal infection in horses kept in close contact with dogs experimentally infected with canine influenza A virus (H3N8). *Acta Vet. Scand.* 54, 25 (2012)
- 46) Yagi H, Watanabe S, Suzuki T, Takahashi T, Suzuki Y, Kato K: Comparative Analyses of N-Glycosylation Profiles of Influenza A Viruses Grown in Different Host Cells. *Open Glycoscience* 5, 2-12 (2012)
- 47) Watanabe K, Hidari IP J K, Suzuki T: Cold-shock protein expression system

- facilitates the solubility of human ST6Gal I in *Escherichia coli*. *Open Glycoscience* 5, 13-18 (2012)
- 48) Yamada S, Shinya K, Takada A, Ito T, Suzuki T, Suzuki Y, Le QM, Ebina M, Kasai N, Kida H, Horimoto T, Rivaller P, Chen LM, Donis RO, Kawaoka Y: Adaptation of a duck influenza A virus in quail. *J. Virol.* 86, 1411-1420 (2012)
- 49) Chen J, Yamada S, Hama Y, Shetty AK, Kobayashi T, Oda H, Seiki K, Kim E, Kimura T, Takahashi N, Hidari KI, Suzuki T, Suzuki Y, Sugahara K: Unique heparan sulfate from shrimp heads exhibits a strong inhibitory effect on infections by dengue virus and Japanese encephalitis virus. *Biochem. Biophys. Res. Commun.* 412, 136-142 (2011)
- 50) Minami A, Shimizu H, Meguro Y, Shibata N, Kanazawa H, Ikeda K, Suzuki T: Imaging of sialidase activity in rat brain sections by a highly sensitive fluorescent histochemical method. *NeuroImage* 58, 34-40 (2011)
- 51) Fukushima K, Takahashi T, Takaguchi M, Ueyama H, Ito S, Kurebayashi Y, Kawanishi T, McKimm-Breschkin JL, Takimoto T, Minami A, Suzuki T: Plaque formation assay for human parainfluenza virus type 1. *Biol. Pharm. Bull.* 34, 996-1000 (2011)
- 52) Nishino R, Ikeda K, Hayakawa T, Takahashi T, Suzuki T, Sato M: Syntheses of 2-deoxy-2,3-didehydro-N-acetylneuraminic acid analogues modified by N-sulfonylamidino groups at the C-4 position and biological evaluation as inhibitors of human parainfluenza virus type 1. *Bioorg. Med. Chem.*, 19, 2418-2427 (2011)
- 53) Wichit S, Jittmittraphap A, Hidari KI, Thaisomboonsuk B, Petmitr S, Ubol S, Aoki C, Itonori S, Morita K, Suzuki T, Suzuki Y, Jampangern W: Dengue virus type 2 recognizes carbohydrate moiety of neutral glycosphingolipids in mammalian and mosquito cells. *Microbiol. Immunol.* 55, 135-140 (2011)
- 54) Yoshida A, Hirooka Y, Sugata Y, Nitta M, Manabe T, Ido S, Murakami K, Saha KR, Suzuki T, Ohshima M, Yoshida A, Itoh K, Shimizu K, Oku N, Furuta T, Asakawa T, Wakimoto T, Kan T: Concise synthesis of catechin probes that would enable analysis and imaging of EGCg dynamics. *Chem. Comm.* 47, 1794-1796 (2011)
- 55) Takaguchi M, Takahashi T, Hosokawa C, Ueyama H, Fukushima K, Hayakawa T, Itoh K, Ikeda K, Suzuki T: A single amino acid mutation at position 170 of human parainfluenza virus type 1 fusion glycoprotein induces obvious syncytium formation and caspase-3-dependent cell death. *J. Biochem.* 149, 191-202 (2011)
- 56) Muranaka M, Yamanaka T, Katayama Y, Hidari K, Kanazawa H, Suzuki T, Oku K, Oyamada T: Distribution of influenza virus sialoreceptors on upper and lower respiratory tract in horses and dogs. *J. Vet. Med. Sci.* 73, 125-127 (2011)

- 57) Takahashi T, Kurebayashi Y, Ikeya K, Mizuno T, Fukushima K, Kawamoto H, Kawaoka Y, Suzuki Y, Suzuki T: The Low-pH Stability Discovered in Neuraminidase of 1918 Pandemic Influenza A Virus Enhances Virus Replication. *PLoS One* 5 (12), e15556 (2010)
- 58) Nidom CA, Takano R, Yamada S, Sakai-Tagawa Y, Daulay S, Aswadi D, Suzuki T, Suzuki Y, Shinya K, Iwatsuki-Horimoto K, Muramoto Y, Kawaoka Y: Influenza A (H5N1) viruses from pigs, Indonesia. *Emerg. Infect. Dis.* 16, 1515-1523 (2010)
- 59) Kato D, Era S, Watanabe I, Arihara M, Sugiura N, Kimata K, Suzuki Y, Morita K, Hidari KI, Suzuki T: Antiviral activity of chondroitin sulphate E targeting dengue virus envelope protein. *Antiviral Res.* 88, 236-243 (2010)
- 60) Yamanaka T, Tsujimura K, Kondo T, Matsumura T, Ishida H, Kiso M, Hidari KI, Suzuki T: Infectivity and pathogenicity of canine H3N8 influenza a virus in horses. *Influenza Other Respi. Viruses* 4, 345-351 (2010)
- 61) Saha RK, Takahashi T, Kurebayashi Y, Fukushima K, Minami A, Kinbara N, Ichitani M, Sagesaka YM, Suzuki T: Antiviral effect of strictinin on influenza virus replication. *Antiviral Res.* 88, 10-18 (2010)
- 62) Takahashi T, Satoh H, Takaguchi M, Takafuji S, Yokoyama H, Fujii S, Suzuki T: Binding of sulfatide to recombinant hemagglutinin of influenza A virus produced by a baculovirus protein expression system. *J. Biochem.* 147, 459-462 (2010)
- 63) Takahashi T, Hashimoto A, Maruyama M, Ishida H, Kiso M, Kawaoka Y, Suzuki Y, Suzuki T: Identification of amino acid residues of influenza A virus H3 HA contributing to the recognition of molecular species of sialic acid. *FEBS Lett.* 583, 3171-3174 (2009)
- 64) Sriwilaijaroen N, Wilairat P, Hiramatsu H, Takahashi T, Suzuki T, Ito M, Ito Y, Tashiro M, Suzuki Y: Mechanisms of the action of povidone-iodine against human and avian influenza A viruses: its effects on hemagglutination and sialidase activities. *Viol. J.* 6, 124 (2009)
- 65) Sakamoto J, Koyama T, Miyamoto D, Yingsakmongkon S, Hidari KI, Jampangern W, Suzuki T, Suzuki Y, Esumi Y, Nakamura T, Hatano K, Terunuma D, Matsuoka K: Systematic syntheses of influenza neuraminidase inhibitors: A series of carbosilane dendrimers uniformly functionalized with thioglycoside-type sialic acid moieties. *Bioorg. Med. Chem.* 17, 5451-5464 (2009)
- 66) Ogata M, Hidari KI, Kozaki W, Murata T, Hiratake J, Park EY, Suzuki T, Usui T: Molecular Design of Spacer-N-Linked Sialoglycopolyptide as Polymeric Inhibitors Against Influenza Virus Infection. *Biomacromolecules* 10, 1894-1903 (2009)
- 67) Saha RK, Takahashi T, Suzuki T: Glucosyl Hesperidin Prevents Influenza A Virus

- Replication In Vitro by Inhibition of Viral Sialidase. *Biol. Pharm. Bull.* 32, 1188-1192 (2009)
- 68) Hidari KI, Oyama K, Ito G, Nakayama M, Inai M, Goto S, Kanai Y, Watanabe K, Yoshida K, Furuta T, Kan T, Suzuki T: Identification and characterization of flavonoids as sialyltransferase inhibitors. *Biochem. Biophys. Res. Commun.* 382, 609-613 (2009)
- 69) Ogata M, Hidari KI, Murata T, Shimada S, Kozaki W, Park EY, Suzuki T, Usui T: Chemoenzymatic Synthesis of Sialoglycopolypeptides As Glycomimetics to Block Infection by Avian and Human Influenza Viruses. *Bioconjugate. Chem.*, 20, 538–549 (2009)
- 70) Takahashi T, Moriyama Y, Ikari A, Sugatani J, Suzuki T, Miwa M: Surface localization of the nuclear receptor CAR in influenza A virus-infected cells. *Biochem. Biophys. Res. Commun.*, 368, 550-555 (2008)
- 71) Yingsakmongkon S, Miyamoto D, Sriwilaijaroen N, Fujita K, Matsumoto K, Jampangern W, Hiramatsu H, Guo CT, Sawada T, Takahashi T, Hidari K, Suzuki T, Ito M, Ito Y, Suzuki Y: In Vitro Inhibition of Human Influenza A Virus Infection by Fruit-Juice Concentrate of Japanese Plum (*Prunus mume* Sieb. et Zucc). *Biol. Pharm. Bull.*, 31, 511-515 (2008)
- 72) Miyamoto D, Hasegawa S, Sriwilaijaroen N, Yingsakmongkon S, Hiramatsu H, Takahashi T, Hidari K, Guo CT, Sakano Y, Suzuki T, Suzuki Y: Clarithromycin Inhibits Progeny Virus Production from Human Influenza Virus-infected Host Cells. *Biol. Pharm. Bull.*, 31, 217-222 (2008)
- 73) Yagi H, Yasukawa N, Yu SY, Guo CT, Takahashi N, Takahashi T, Bukawa W, Suzuki T, Khoo KH, Suzuki Y, Kato K.: The expression of sialylated high-antennary N-glycans in edible bird's nest. *Carbohydr. Res.*, 343, 1373-1377 (2008)
- 74) Takahashi T, Murakami K, Nagakura M, Kishita H, Watanabe S, Honke K, Ogura K, Tai T, Kawasaki K, Miyamoto D, Hidari KI, Guo CT, Suzuki Y, Suzuki T: Sulfatide Is Required for Efficient Replication of Influenza A Virus. *J. Virol.*, 82, 5940-5950 (2008)
- 75) Hidari KI, Murata T, Yoshida K, Takahashi Y, Minamijima YH, Miwa Y, Adachi S, Ogata M, Usui T, Suzuki Y, Suzuki T: Chemoenzymatic synthesis, characterization, and application of glycopolymers carrying lactosamine repeats as entry inhibitors against influenza virus infection. *Glycobiology*, 18, 779-788 (2008)
- 76) Ikeda K, Sato K, Nishino R, Aoyama S, Suzuki T, Sato M: 2-Deoxy-2,3-didehydro-N-acetylneuraminic acid analogs structurally modified by thiocarbamoylalkyl groups at the C-4 position: Synthesis and biological evaluation

- as inhibitors of human parainfluenza virus type 1. *Bioorg. Med. Chem.*, 16, 6783-6788 (2008)
- 77) Hidari KI, Takahashi N, Arihara M, Nagaoka M, Morita K, Suzuki T: Structure and anti-dengue virus activity of sulfated polysaccharide from a marine alga. *Biochem. Biophys. Res. Commun.*, 376, 91-95 (2008)
- 78) Furuta T, Mochizuki M, Ito M, Takahashi T, Suzuki T, Kan T: Versatile Synthesis of Head Group Functionalized Phospholipids via Oxime Bond Formation. *Org. Lett.*, 10, 4847-4850 (2008)
- 79) Hidari KI, Shimada S, Suzuki Y, Suzuki T: Binding kinetics of influenza viruses to sialic acid-containing carbohydrates. *Glycoconjugate J.* 24, 583-590 (2007)
- 80) Guo CT, Takahashi N, Yagi H, Kato K, Takahashi T, Yi SQ, Chen Y, Ito T, Otsuki K, Kida H, Kawaoka Y, Hidari KI, Miyamoto D, Suzuki T, Suzuki Y: The quail and chicken intestine have sialyl-Gal sugar chains responsible for the binding of influenza A viruses to human type receptors. *Glycobiology* 17, 713-724 (2007)
- 81) Sato k, Ikeda K, Suzuki T, Aoyama S, Maki N, Suzuki Y, Sato M: Synthesis of 4-O-[3-(aryl)prop-2-ynyl]-Neu5Ac2en and its 4-epi-analogs modified at C-4 by Sonogashira coupling reaction. *Tetrahedron* 63, 7571-7581 (2007)
- 82) Furuta T, Hirooka Y, Abe A, Sugata Y, Ueda M, Murakami K, Suzuki T, Tanaka K, Kan T: Concise synthesis of dideoxy-epigallocatechin gallate (DO-EGCG) and evaluation of its anti-influenza virus activity. *Bioorg. Med. Chem. Lett.* 17, 3095-3098 (2007)
- 83) Tindal DJ, Dyason JC, Thomson RJ, Suzuki T, Ueyama H, Kuwahara Y, Maki N, Suzuki Y, Itzstein M.: Synthesis and evaluation of 4-O-alkylated 2-deoxy-2,3-didehydro-N-acetylneuraminic acid derivatives as inhibitors of human parainfluenza virus type-3 sialidase activity. *Bioorg. Med. Chem. Lett.* 17, 1655-1658 (2007)
- 84) Yamada A, Hatano K, Koyama T, Matsuoka K, Takahashi N, Hidari KI, Suzuki T, Suzuki Y, Terunuma D.: Lactotriose-containing carbosilane dendrimers: syntheses and lectin-binding activities. *Bioorg. Med. Chem.*, 15, 1606-1614 (2007)
- 85) Ogata M, Murata T, Murakami K, Suzuki T, Hidari KI, Suzuki Y, Usui T.: Chemoenzymatic synthesis of artificial glycopolypeptides containing multivalent sialyloligosaccharides with a gamma-polyglutamic acid backbone and their effect on inhibition of infection by influenza viruses. *Bioorg. Med. Chem.*, 15, 1383-1393 (2007)
- 86) Sakamoto J, Koyama T, Miyamoto D, Yingsakmongkon S, Hidari KI, Jampangern W, Suzuki T, Suzuki Y, Esumi Y, Hatano K, Terunuma D, Matsuoka K: Thiosialoside

- clusters using carbosilane dendrimer core scaffolds as a new class of influenza neuraminidase inhibitors. *Bioorg. Med. Chem. Lett.*, 17, 717-721 (2007)
- 87) Matsuoka K, Takita C, Koyama T, Miyamoto D, Yingsakmongkon S, Hidari KI, Jampangern W, Suzuki T, Suzuki Y, Hatano K, Terunuma D: Novel linear polymers bearing thiosialosides as pendant-type epitopes for influenza neuraminidase inhibitors. *Bioorg. Med. Chem. Lett.* 17, 3826–3830 (2007)
- 88) Yamada S, Suzuki Y, Suzuki T, Le MQ, Nidom CA, Sakai-Tagawa Y, Muramoto Y, Ito M, Kiso M, Horimoto T, Shinya K, Sawada T, Kiso M, Usui T, Murata T, Lin Y, Hay A, Haire LF, Stevens DJ, Russell RJ, Gamblin SJ, Skehel JJ, Kawaoka Y: Hemagglutinin mutations responsible for the binding of H5N1 Influenza A Viruses to human-type receptors. *Nature* 444, 378-382 (2006)
- 89) Ikeda, K., Sato, K., Kitani, S., Suzuki, T., Maki, N., Suzuki, Y., Sato M: 2-deoxy-2,3-didehydro-N-acetylneuraminic acid analogues structurally modified at the C-4 position: Synthesis and biological evaluation as inhibitors of human parainfluenza virus type1. *Bioorg. Med. Chem.* 14, 7893-7897 (2006)
- 90) Hidari, IP J. K., Suzuki, Y., Suzuki T: Suppression of the biosynthesis of cellular sphingolipids results in the inhibition of the maturation of influenza virus particles in MDCK cells. *Biol. Pharm. Bull.* 29, 1575-1579 (2006)
- 91) Makimura, Y., Watanabe, S., Suzuki, T., Suzuki, Y., Ishida, H., Kiso, M., Katayama, T., Kumagai, H., Yamamoto, K: Chemoenzymatic synthesis and application of a sialoglycopolymer with a chitosan backbone as a potent inhibitor of human influenza virus hemagglutination. *Carbohydr. Res.* 341, 1803-1808 (2006)
- 92) Guo CT, Takahashi T, Bukawa W, Takahashi N, Yagi H, Kato K, Hidari KI, Miyamoto D, Suzuki T, Suzuki Y: Edible bird's nest extract inhibits influenza virus infection. *Antiviral Res.* 70, 140-146 (2006)
- 93) Matrosovich, M., Suzuki, T., Hirabayashi, Y., Garten, W., Webster, R. G., Klenk, H.-D: Gangliosides are not essential for influenza virus infection. *Glycoconjugate J.*, 23, 107-113 (2006)
- 94) Aoki C, Hidari, IP J K, Itonori S, Yamada A, Takahashi N, Kasama T, Hasebe F, Islam M A, Hatano K, Matsuoka K, Taki T, Guo CT, Takahashi T, Sakano Y, Suzuki T, Miyamoto D, Sugita M., Terunuma D., Morita K., Suzuki Y: Identification and characterization of carbohydrate molecules in Mammalian cells recognized by dengue virus type 2. *J. Biochem.* 139, 607-614 (2006)
- 95) Kogure T, Suzuki T, Takahashi T, Miyamoto D, Hidari IP J K, Guo C-T, Ito T, Kawaoka Y, Suzuki Y: Human trachea primary epithelial cells express both sialyl-2,3 Gal receptor for human parainfluenza virus type 1 and avian influenza

- viruses, and sialyl-2,6Gal receptor for human influenza viruses. *Glycoconjugate J.*, 23, 101-106 (2006)
- 96) Talabnin K, Yagi H, Takahashi N, Suzuki T, Kato K, Uemura H, Saichua P, Kaewkes S, Wongkham S, Suzuki Y, Sripa B: Glycobiological study of adult *Opisthorchis viverrini*: Characterization of N-linked oligosaccharides. *Mol. Biochem. Parasit.*, 147, 230-233 (2006)
- 97) Ozcelik P, Bezirci FB, Suzuki Y, Uzawa H, Nishida Y, Kobayashi K, Suzuki T, Miyamoto D, Nagatake T, Ahmed K.: Sulfatide and its synthetic analogues recognition by *Moraxella catarrhalis*. *Microbiol Immunol.* 50, 967-970 (2006)
- 98) Furuta T, Sakai M, Hayashi H, Asakawa T, Kataoka F, Fujii S, Suzuki T, Suzuki Y, Tanaka K, Fishkin N, Nakanishi K: Design and Synthesis of Artificial Phospholipid for Selective Cleavage of Integral Membrane Protein. *Chem. Comm.*, 36, 4575-4577 (2005).
- 99) Suzuki T, Takahashi T, Guo CT, Hidari KI, Miyamoto D, Goto H, Kawaoka Y, Suzuki Y.: Sialidase activity of influenza A virus in a endocytic pathway enhances viral replication. *J. Virol.*, 79, 11705-11715 (2005).
- 100) Shinya K, Hatta M, Yamada S, Takada A, Watanabe S, Halfmann P, Horimoto T, Neumann G, Kim JH, Lim W, Guan Y, Peiris M, Kiso M, Suzuk, T, Suzuki Y, Kawaoka Y: Characterization of a human H5N1 influenza A virus isolated in 2003. *J Virol.*, 79, 9926-9932 (2005).
- 101) Hidari, IP J K, Horie N, Murata T, Miyamoto D, Suzuki T, Usui T, Suzuki Y: Purification and characterization of a soluble recombinant human ST6Gal I functionally expressed in *Escherichia coli*. *Glycoconjugate. J.*, 22, 1-11 (2005).
- 102) Le QM, Kiso M, Someya K, Sakai YT, Nguyen TH, Nguyen KH, Pham ND, Ngyen HH, Yamada S, Muramoto Y, Horimoto T, Takada A, Goto H, Suzuki T, Suzuki Y, Kawaoka Y.: Isolation of drug-resistant H5N1 virus. *Nature*, 437, 1108 (2005).
- 103) Saito T, Nakaya Y, Suzuki T, Ito R, Saito T, Saito H, Takao S, Sahara K, Odagiri T, Murata T, Usui T, Suzuki Y, Tashiro M: Antigenic alteration of influenza B virus associated with loss of a glycosylation site due to host-cell adaptation. *J. Med. Virol.*, 74, 336-343, (2004).
- 104) Hidari IP J K, Tsujii E, Hiroi J, Mano E, Miyatake A, Miyamoto D, Suzuki T, Suzuki Y: In vitro and in vivo inhibitory effects of disodium cromoglycate on influenza virus infection. *Biol. Pharm. Bull.*, 27, 825-830, (2004).
- 105) Ikeda K, Kitani S, Sato K, Suzuki T, Hosokawa C, Suzuki Y, Tanaka K, Sato M: 28,38-Difluorosialic acid derivatives structurally modified at the C-4 position:

- synthesis and biological evaluation as inhibitors of human parainfluenza virus type 1. *Carbohydr. Res.*, 339, 1367-1372, (2004).
- 106) Sasaki K, Nishida Y, Kambara M, Uzawa H, Takahashi T, Suzuki T, Suzuki Y, Kobayashi K: Design of N-acetyl-6-sulfo- β -D-glucosaminide-based inhibitors of influenza virus sialidase. *Bioorg. Med. Chem.*, 12, 1367-1375, (2004).
- 107) Suzuki T, Takahashi T, Saito T, Guo CT, Hidari KI, Miyamoto D, Suzuki Y: Evolutional analysis of human influenza A virus N2 neuraminidase genes based on the transition of the low-pH stability of sialidase activity. *FEBS. Lett.*, 557, 228-232, (2004).
- 108) Ogawa D, Shikata K, Honke K, Sato S, Matsuda M, Nagase R, Tone A, Okada S, Usui H, Wada J, Miyasaka M, Kawashima H, Suzuki Y, Suzuki T, Taniguchi N, Hirahara Y, Tadano-Aritomi K, Ishizuka I, Tedder TF, Makino H: Cerebroside sulfotransferase deficiency ameliorates L-selectin-dependent monocyte infiltration in the kidney after ureteral obstruction. *J. Biol. Chem.*, 279, 2085-2090, (2004).
- 109) Kobasa D, Takada A, Shinya K, Hatta M, Halfmann P, Theriault S, Suzuki H, Nishimura H, Mitamura K, Sugaya N, Usui T, Murata T, Maeda Y, Watanabe S, Suresh M, Suzuki T, Suzuki Y, Feldmann H, Kawaoka Y: Enhanced virulence of influenza A viruses with the haemagglutinin of the 1918 pandemic virus. *Nature*, 431, 703-707 (2004).
- 110) Ohta T, Miura N, Fujitani N, Nakajima F, Niikura K, Sadamoto R, Guo C-T, Suzuki T, Suzuki Y, Monde K, Nishimura S-I: Glycotentacles: synthesis of cyclic glycopeptides, toward a tailored blocker of influenza virus hemagglutinin. *Angew. Chem. Int. Ed.*, 42, 5186-5189, (2003).
- 111) Suzuki T, Takahashi T, Nishinaka D, Murakami M, Fujii S, Hidari I-P Jwa K, Miyamoto D, Yu-The L, Suzuki Y: Inhibition of influenza A virus sialidase activity by sulfatide. *FEBS Lett.*, 553, 355-359, (2003).
- 112) Takahashi T, Suzuki T, Hidari I-P Jwa K, Miyamoto D, Suzuki Y: A molecular mechanism for the low-pH stability of sialidase activity of influenza A virus N2 neuraminidases. *FEBS Lett.*, 543, 71-75, (2003).
- 113) Kojima S, Hasegawa T, Yonemura T, Sasaki K, Yamamoto K, Makimura Y, Takahashi T, Suzuki T, Suzuki Y, Kobayashi K: Ruthenium complexes carrying a disialo complex-type oligosaccharide: enzymatic synthesis and its application to a luminescent probe to detect influenza viruses. *Chem. Comm.*, 11, 1250-1251, (2003).
- 114) Totani K, Kubota T, Kuroda T, Murata T, Hidari I-P Jwa K, Suzuki T, Suzuki Y, Kobayashi K, Ashida H, Yamamoto K, Usui T: Chemoenzymatic synthesis and application of glycopolymers containing multivalent sialyloligosaccharides with a

poly(L-glutamic acid) backbone for inhibition of infection by influenza viruses. *Glycobiol.*,13, 315-326, (2003).

- 115) Komagome R, Sawa H., Suzuki T, Suzuki Y, Tanaka S, Atwood J W, Nagashima K: Oligosaccharides as receptors for JC virus. *J. Virol.*, 76, 12992-13000, (2002).
- 116) Guo C-T, Sun X-L, Kania O, Shortridge F K, Suzuki, T, Miyamoto D, Hidari I-P Jawa K, Wong C-H, Suzuki Y: An O-glycoside of sialic acid derivative that inhibits both hemagglutinin and sialidase activities of influenza viruses. *Glycobiol.*, 12, 183-190, (2002).

Reviews

- 1) Tadanobu Takahashi and Takashi Suzuki: Low-pH Stability of Influenza A Virus Sialidase Contributing to Virus Replication and Pandemic. *Biol. Pharm. Bull.* 38, 817-826 (2015)
- 2) Tadanobu Takahashi and Takashi Suzuki: Role of Sulfatide in Influenza A virus Replication. *Biol. Pharm. Bull.* 38, 809-816 (2015)
- 3) Tadanobu Takahashi and Takashi Suzuki: Role of glycans in viral infection. *Sugar Chains*, Springer Publishing, p. 71-93 (2015) DOI: 10.1007/978-4-431-55381-6_5
- 4) Tadanobu Takahashi and Takashi Suzuki: Binding of influenza viruses to glycans. *Glycoscience: Biology and Medicine (Part IIIIV, Microbial Glycobiology and Infection, Glycobiology: Role of Glycans in Infections)*, Springer Publishing, pp 769-774 (2014)
- 5) Minami A., Suzuki T.: Activity and the Role of Sialidase in the Brain. *Trends in Glycoscience and Glycotechnology Vol. 24 (No. 137)*, 112-121 (2012)
- 6) Takahashi T., and Suzuki T. : Role of sulfatide in normal and pathological cells and tissues. *J. Lipid Res.* 53, 1437-1450 (2012)
- 7) Hidari I.P.J. K., Suzuki T.: Antiviral agents targeting glycans on dengue virus E-glycoprotein. *Expert. Rev. Anti. Infect. Ther.* 9, 983-985 (2011)
- 8) Takahashi T., Suzuki T.: Function of membrane rafts in viral lifecycles and host cellular response. *Biochem. Res. Int.* 2011, 245090 (2011)
- 9) Hidari I.P.J. K., Suzuki T.: Dengue virus receptor. *Trop. Med. Health.* 39(4 Suppl), 37-43 (2011)
- 10) Suzuki, T., Suzuki, Y.: Virus Infection and Lipid Rafts. *Biol. Pharm. Bull.* 29, 1538-1541 (2006)